

Commentary on candidate 6 evidence (Verification of an Equation of Motion)

The evidence for this candidate has achieved the following marks for each section of this course assessment component.

Section	Expected response	Maximum mark	Mark awarded	Commentary
1 Aim	An aim that describes clearly the purpose of the investigation.	1	1	The candidate's aim clearly describes the purpose of the investigation.
2 Underlying physics	An account of physics relevant to the aim of the investigation.	3	2	<p>The candidate has defined acceleration and has correctly derived the relationships</p> $s = ut + \frac{1}{2}at^2 \text{ and } v^2 = u^2 + 2as$ <p>This is at an appropriate level. The symbols used are not defined but are standard symbols.</p> <p>To be a good account, the candidate could have described how the apparatus measures speed and acceleration, and compared $v^2 = 2as$ to the equation for a straight line, highlighting the significance of the gradient and intercept.</p>

Section	Expected response	Maximum mark	Mark awarded	Commentary
3a Brief summary	A brief summary of the approach(es) used to collect experimental data.	1	1	The candidate has briefly summarised what they are measuring in the experiment and has indicated the measuring instrument used.
3b Sufficient raw data	Sufficient raw data from the candidate's experiment.	1	1	The candidate has made repeated measurements of both v and a , over a reasonable range producing five data points.
3c Data table	Data, including any mean and/or derived values, presented in correctly produced table(s).	1	0	The candidate has presented the experimental data in a table with mean and derived values calculated correctly. The unit for v^2 , however, is incorrect.
3d Relevant data	Data relevant to the experiment from an internet/literature source or data relevant to the aim of the investigation from a second experiment.	1	0	The candidate has not included data from either an internet/literature source relevant to the experiment, or data from a second experiment which is relevant to the aim of the investigation.

Section	Expected response	Maximum mark	Mark awarded	Commentary
3e Citation and reference	A citation and reference for a source of internet/literature data or information.	1	0	<p>A source has been correctly referenced at the end of the report but has not been cited.</p> <p>However, since the candidate has completed a single experiment, the reference must be to a source of data relevant to their experiment, from internet/literature. Even if referenced and cited correctly, the candidate's reference would not be sufficient for the mark to be awarded in this section.</p>
4a Axes scaled	The axes of the graph have suitable scales.	1	1	The axes of the candidate's graph have suitable linear scales.
4b Axes labels	The axes of the graph have suitable labels and units.	1	1	The axes of the candidate's graph have suitable labels and units.
4c Accurately plotted data points and line of best fit	Accurately plotted data points and, where appropriate, a line of best fit.	1	1	The candidate has accurately plotted all data points on the graph. The line of best fit is acceptable at this level.
5 Uncertainties	Scale reading uncertainties and random uncertainties.	2	0	The candidate has stated the scale reading uncertainties in the TSA used to measure speed and acceleration. However, the scale reading uncertainties quoted are not consistent with the values in the table of results.

Section	Expected response	Maximum mark	Mark awarded	Commentary
				The candidate has not correctly calculated the random uncertainties in values of acceleration and final speed. (There is an error in the first row of the uncertainties table).
6 Analysis	Analysis of experimental data.	1	0	The calculation of mean and derived values is not part of the analysis section. The correct calculation of the gradient of the line of best fit on the graph is acceptable analysis. However, the candidate uses the gradient (rather than its inverse) to compare to $2s$, which is incorrect.
7 Conclusion	A valid conclusion that relates to the aim and is supported by all the data in the report.	1	0	The candidate has made a conclusion which is relevant to the aim but not supported by the data in the report. Despite the candidate's <i>nearly</i> statement, the line of best fit does not pass through the origin, so, strictly speaking, there is no evidence for direct proportionality. Had the candidate added the phrase ' <i>within the limits of experimental uncertainty</i> ', the mark for this section could have been awarded.
8 Evaluation	Evaluation of the investigation.	3	2	The candidate has made three evaluative statements. The first identifies the systematic uncertainty suggested by the line of best fit 'missing' the origin. It is not

Section	Expected response	Maximum mark	Mark awarded	Commentary
				<p>possible to know the cause, but the candidate makes a realistic suggestion.</p> <p>The second and third statements cover common ground (frictional effects), and while frictional effects are not the cause of an incorrect determination of the length of the runway, friction may have had other effects. The candidate has therefore identified a potential issue and has made a suggestion which would minimise the issue.</p>
9 Structure	A clear and concise report with an informative title.	1	1	The candidate's report is clear and concise and has an informative title.
Total		20	11	